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Tracking and Profiling Successful IT Graduates

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Abstract

This paper presents the findings of the UTS Successful Graduates Research Project which was undertaken by the UTS Planning and Quality Unit (PQU) in partnership with UTS Faculties, professional bodies and key industry organisations between 2001 and 2004. It consisted of a linked set of studies tracking successful graduates from any university in their first years of professional practice after graduation in the unique context of each profession.

The results demonstrate that, although a high level of technical, profession-specific knowledge is necessary for successful practice, it is clearly not sufficient. A range of emotional intelligence, cognitive capabilities and generic skills are identified as critical success factors. Indeed, one of the key findings is that it is the combination of key elements of emotional intelligence, cognitive capabilities, generic and job specific skills and knowledge that is telling, not excellence in one domain. The results have important implications for current curriculum design and assessment in universities and for recruitment criteria in the areas investigated. Strategies for inculcating emotional intelligence in graduates are suggested.

Keywords
IA01 IS Curriculum; IA03 Computer Science Education; ID03 Future Information Professional

INTRODUCTION

One of the main aims of undergraduate programs at universities is to prepare students for productive careers as professionals. Such programs intend to equip students with the capabilities necessary to perform effectively in their chosen professions. Graduate employability or success in professional practice is often perceived as a key indicator of the quality of the university education. "Graduate outcomes are a critical indicator of how effectively universities are defining and instilling the skills and attributes expected of their graduates, with success in the labour market being the most obvious indicator of good outcomes." (Department of Education, Training and Youth Affairs, 1999, p.15).

Results from such surveys provide extensive and consistent evidence that students perceive universities to be of higher quality when they provide learning content and experiences that are relevant to subsequent professional practice. According to Alan Tough's ground-breaking research (1979) what really motivates students is having access to information about what actually makes for successful practice from those already further down the same learning path. But, until graduates have come to grips with the realities of sustained full-time work, they are not well positioned to make specific recommendations about what sorts of university assessment, curriculum and support constitute the best preparation for the complexities of current professional practice. Yet, it is hard to find studies that have followed up graduates during their first 2-5 years of professional work in order to investigate these issues.

Of course, universities do use a range of procedures already to 'backward map' (Elmore, 1979) from professional experience in order to improve undergraduate learning programs and ensure that what is assessed is valid. Common practices include the use of course or faculty advisory committees, professional accreditation committees and criteria, reference to the Australian Qualifications Framework and employer surveys. Employers and professionals involved in the advisory committee work tend, however, to be very experienced and in senior positions. Because of this they may no longer be familiar with the realities of the early years of professional work, with what is most relevant for new graduates or have a practical understanding of the full range of contexts in which they must operate.

The UTS Successful Graduates Research Project which was undertaken from 2001 to 2004 to address this gap in applied higher education. It is a linked set of studies of successful graduates in the early stages of their career across a wide range of professions. The aims of the study are:

- to identify the capabilities that are seen to be most important for successful professional practice in the first years after graduation;
- to determine the extent to which the universities have focused on developing these capabilities; and
- to review the existing UTS undergraduate curriculum in the light of the study's findings.

Studies using the same conceptual framework have been completed in accounting, architecture, education, engineering (Scott & Yates, 2002), information technology (Scott and Wilson, 2003), journalism, law, nursing (Scott, 2003) and sport management.

Based on the results of these studies, the research aim of this paper is to address the following questions:

RQ1 How do IT professionals' rankings of capabilities compare in terms of the most highly and least highly rated?

RQ2 How do IT professionals compare with other professionals in their opinions of the relative importance of capabilities in the workplace and in university focus?

This paper first discusses the conceptual framework for professional capability. Second, drawing upon the quantitative and qualitative data obtained through in-depth interviews of successful graduates and their employers and a survey of successful graduates, the capabilities perceived as most and least important by successful graduates for effective professional practice in each particular profession as well as across professions are identified. In addition, potential areas of good practice and potential areas for enhancement are suggested. Finally, the implications for undergraduate curriculum design are discussed.

CONCEPTUAL FRAMEWORK

"A conceptual framework explains either graphically or in narrative form, the main dimensions of a study – the key factors, constructs or variables – and the presumed relationships between them" (Huberman and Miles, 2001).

The conceptual framework for professional capability which has guided the present study has been adapted from the framework suggested by Scott (2003). It is based on research on professional and vocational competence and expertise by Schön (1983), Morgan (1988), Gonczi, Hagar and Oliver (1990), Tennant (1991) and, more recently, by Binney and Williams (1995), Gardiner (1995), Scott (1996), Goleman (1998, 2000), Goleman, Boyatzis & McKee (2002), Department of Education, Science and Training (2002) and the U.K. Centre for Research into Quality (2004). There is much confusion about the exact meaning of terms such as 'competence', 'generic skills', 'generic attributes', 'graduate attributes' and 'generic knowledge' in current discussions of education. This paper uses the term 'capability' and sees it as including a combination of emotional intelligence (Damasio, 1994; Goleman, 1998), cognitive intelligence and creative thinking (Dewey, 1933; Csikszentmihalyi, 1996) as well as appropriate profession-specific skills and knowledge and 'generic skills'. In this perspective 'generic skills' are seen as involving skills and associated knowledge which are more readily transferable from one practice situation to a quite different one. This would include, for example, skills like basic word-processing and email skills, the ability to chair meetings, filing, data-management, self-managed learning skills, information literacy and so on. The conceptual framework of professional capability is comprised of four interlocked components represented in Figure 1.

Figure 1 illustrates that the possession of job specific and generic skills (C and D) is necessary but not sufficient for effective professional performance. Professional capability is most tested in a challenging or difficult situation, not when things are running smoothly or routinely. In challenging situations the individual must use a combination of well-developed emotional intelligence (A) and a sharp, contingent way of thinking to diagnose what is going on and establish a suitable strategy for addressing the problem (B). This strategy brings together and competently delivers the appropriate selection of job-specific and generic skills and knowledge (C and D) most suitable to resolve the situation. This suggests, for example, that, if professionals cannot remain calm when things go wrong or are unable to work constructively with staff then, no matter how intelligent they may be or how much they may know, they will not be able to resolve the situation productively. The study's conceptual framework for professional capability suggests, therefore, that it is the combination of brain and heart that ultimately makes the difference.

It is from within this framework that the 38 items which make up the Professional Capability Scale used in the Successful Graduates Surveys have been developed. They have been consistently rated as important by graduates across all of the professions studied so far, although their rank order shows some variation, depending upon the profession involved. The items that make up this scale are given in Appendix A.

The second framework used in the study is based on research on factors that most effectively engage tertiary students in productive adult learning (Foley, 2000). It represents an overall quality assurance framework for learning design and

delivery and indicates that tertiary students will be more likely to engage in productive learning when their programs of study:

R Are immediately RELEVANT to their particular background, abilities, needs and experiences;

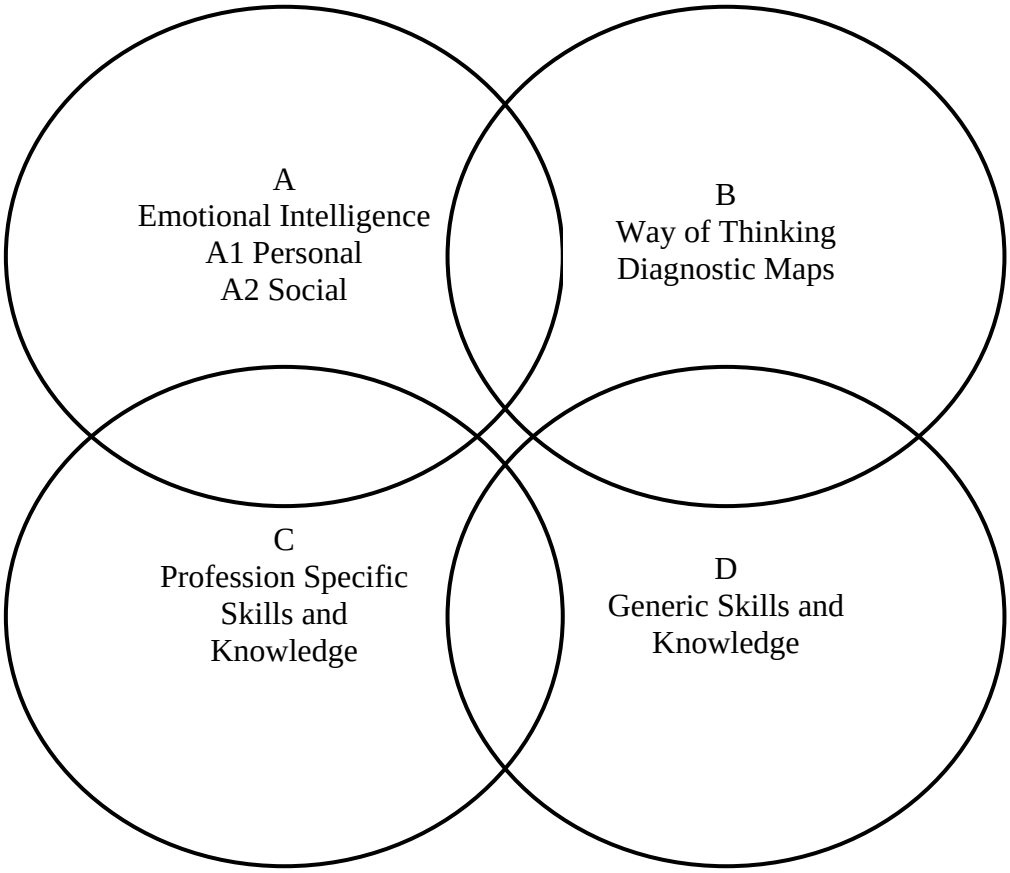

Figure 1: Professional Capability Framework

A Provide more opportunities for ACTIVE learning than they do for passive learning – in particular when they include frequent opportunities for students to make contact with people who are further down the same learning path and to actively search a range of relevant data bases;

T Consistently link THEORY WITH PRACTICE;

E Effectively manage students' EXPECTATIONS right from the outset;

D Ensure that learning proceeds logically and is 'DIGESTIBLE';

C Use a valid graduate CAPABILITY profile to specifically generate appropriate outcomes and assessment tasks. Care is taken to ensure that the subjects used directly address the full capability profile and do not duplicate each other;

L Provide them with opportunities to pursue flexible LEARNING PATHWAYS. Although students are allowed greater flexibility and choice in the subjects undertaken, careful attention is given to ensuring that they still end up with the same spread and quality of capabilities at graduation;

A Ensure that feedback on ASSESSMENT tasks is timely, constructive and detailed;

S Not only include opportunities for SELF-MANAGED LEARNING using both digital and paper-based resources but actively coach students on how to undertake it;

S Provide SUPPORT AND ADMINISTRATIVE SERVICES which are easily accessed, responsive to students needs and which specifically work together to optimise the total experience which a student has of the university or college;

A Ensure that ACCESS to learning times, locations and resources makes participation in the learning program as convenient and productive as possible.

It is from these factors that the eleven items which make up the education quality scale used in the successful graduates studies has been developed. These items are given in Appendix B.

METHODOLOGY

Each UTS Faculty identified key industry partners who have an established relationship with the university, for example, via the professional internship program. The approach adopted then, in all parallel studies of successful graduates, consisted of inviting senior managers in these organisations to nominate successful or high performing staff members with an undergraduate degree relevant to their particular field. The staff member needed to be two to five years out from graduation from any university including overseas institutions. Typically, senior management perceived staff members as successful/high performing when they:

- Consistently complete assigned jobs on time and to agreed standards
- Work positively and constructively with fellow workers
- Consistently receive positive feedback from clients/students/participants.

The study was then conducted in two phases. In phase one in-depth interviews were held with a sub-sample of the nominated group of graduates and their supervisors, using a semi-structured interview schedule. Key questions to the graduates included: Why do you think you were selected as being a successful employee? What is it about you and how you handle your work that you think has impressed the organisation? Can you think of any situation when you really got to demonstrate your level of ability? Examples of key questions to the supervisors were: Why did you select (name person) as being such an effective employee? Can you think of any situation when (name person) really got to demonstrate his/her impressive level of ability? These interviews were used to test the conceptual framework. They were also used to calibrate and ensure that the online survey used in the second phase of the study was appropriate and contextualised in their particular professional environment. The interviews also provided valuable qualitative data in their own right. It is noteworthy that after the first set of sub-studies (engineering, information technology, law, nursing and sport management) were conducted, the interviews were discontinued for the second set of sub-studies (accounting, architecture, education and journalism) as by that time the conceptual framework had been tested adequately.

In phase two the full sample of nominated graduates were invited to complete an online survey. An accompanying letter stated that they had been identified as successful staff members by their supervisor who endorsed the research which was probably instrumental in achieving a high response rate (usually around 80%). Table 1 provides an overview of the participating professions and organisations as well as the number of subjects who were involved in the project.

The online survey asked respondents to rate the capability items in Appendix A first on the relative importance in explaining effective performance in professional practice and then on the extent to which the university course they undertook addressed these capabilities. A 5-point Likert Scale (1-low, 5-high) was used to rate the items. Graduates were also invited to explain their ratings and provide case studies of when their capabilities were most tested. Finally, they were asked to rate the items on educational quality (Appendix B) for importance and performance and to identify those aspects that were perceived to be most and least productive for their first few years of professional practice. The research had the approval of the university's Human Research Ethics Committee. In addition, the sub-study in education was also approved by the Strategic Research Directorate of the NSW Department of Education and Training.

RESULTS AND IMPLICATIONS

Results Presentation

Results are presented by grouping the capability items as ranked highest or lowest on importance for effective performance by successful graduates in their specific profession as well as for effective performance by successful graduates for all professions together. Further, potential areas for improvement are indicated by identifying those capability items which demonstrate a clear discrepancy in rating between importance for professional practice and university focus. The criterion for identifying an item as being of high importance is that it should have a mean above 4.0 which corresponds with 'moderate high' to 'high'. The criterion for identifying an item as low focus is that its mean falls below 3.0 which is the neutral point on the five point Likert scale. The items, which meet these criteria, are labelled as potential areas for improvement.

Potential areas of good practice are also presented. They are determined by identifying those capability items ranked high on both importance for successful professional practice and university focus. The criterion for identifying an item as having high importance is, as mentioned above, that it should have an importance mean which is above 4.0. The criterion for identifying an item as receiving high university focus is that its mean is above 3.5 that is between neutral (3.0) and moderate high (4.0) on the 5-point Likert scale. This test takes into consideration that respondents to higher education quality surveys consistently rank university focus much lower than importance.

In addition, the relative place in importance ranking of job specific skills and knowledge (Scale C), Item 29, is determined for each profession as well as for all professions together.

Table 1: Type of profession, number of industry partners and subjects involved in the Successful Graduates Project

Profession	Industry Partners	Phase I interviews	Phase II survey
Accounting	11 industry partners	N/A	N=17
Architecture	8 architectural firms	N/A	N=20
Education	11 primary schools	N/A	N=22
Engineering	7 engineering companies	2 graduates 2 supervisors	N=18
Information Technology	6 IT companies	4 graduatess 2 supervisors	N=15
Journalism	5 media companies	N/A	N=35
Law	10 law firms	2 graduates 2 supervisors	N=25
Nursing	2 teaching hospitals	2 graduates 2 supervisors	N=18
Sport management	17 sport industry partners	2 graduatess 2 supervisors	N=24
Total		**12 graduates** **10 supervisers**	**N=194**

IT Profession versus All Professions

Of the top ten capability items ranked highest on importance for effective performance by graduates (see Table 2), eight items are common between the IT profession and all professions. Of these eight items, five (62.5%) are from the Emotional Intelligence Scale (A); two items relate to the Intellectual Ability Scale (B) and one comes from the Generic Skills and Knowledge Scale (D). Of the four capability items ranked highly by IT professionals but not in the top ten for all professionals, three (75%) relate to the Intellectual Ability Scale (B). For both sets, the majority of capability items had a mean importance rating above 4.0 which is between 'moderately high' and 'high' on the five point Likert Scale. For all professions there were six capability items with a mean importance rating below 4.0 compared to twelve for the IT profession. However, even the lowest capability item for all professions (Item 32) still attracts an importance rating well above the neutral position (3.0) on the five point Likert Scale (3.79). For the IT profession, only the lowest ranked

capability item (Item 10) is below 3.0 (2.92) with all others above the neutral position. Of the top five (see Table 3), only one item is common to the IT profession and all professions: Item 36 "An ability to help others learn in the workplace" from the Generic Skills and Knowledge Scale (D).

Overall, the results indicate that although each profession has its own unique set of top capabilities, there are some common features. In each of sub-studies by profession, with the exception of law, it is evident that the top capabilities come from three domains: Emotional Intelligence (Scale A), Intellectual Ability (Scale B) and Generic Skills and Knowledge (Scale D). Job Specific Skills and Knowledge (Scale C) are consistently rated lower on importance for effective professional practice. When comparing the relative importance of the different domains, it is Emotional Intelligence that dominates the majority of professions; thus, it seems that well developed personal and interpersonal capabilities are imperative for effective professional performance in a range of professions. This is clearly supported by Table 2 which shows that seven of the top ten items (70%) relate to Emotional Intelligence – a clear indication of the level

Table 2: Items of Most Importance (Top 10): All Professions versus IT Profession

Item: All Professions	Importance	Scale	Item: IT Profession	Importance	Scale
38 Being able to organise my work and manage time effectively	4.75	D	1 Being willing to face and learn from my errors and listen openly to feedback	4.73	A1
7 Wanting to produce as good a job as possible	4.69	A1	8 Being willing to take responsibility for projects, including how they turn out	4.73	A1
27 Being able to set and justify priorities	4.66	B	19 Being able to develop and contribute positively to team-based projects	4.67	A2
4 Being able to remain calm under pressure or when things go wrong	4.63	A1	23 Being able to diagnose what is really causing a problem and then test this out in action	4.67	B
1 Being willing to face and learn from my errors and listen openly to feedback	4.53	A1	22 The ability to use previous experience to figure out what is going on when a current situation takes an unexpected turn	4.67	B
21 Being able to identify from a mass of detail the core issue in any situation	4.53	B	27 Being able to set and justify priorities	4.53	B
16 Being able to work with senior staff without being intimidated	4.46	A2	4 Being able to remain calm under pressure or when things go wrong	4.53	A1
8 Being willing to take responsibility for projects, including how they turn out	4.46	A1	24 An ability to trace out and assess the consequences of alternative courses of action and pick from this the most suitable one	4.47	B
19 Being able to develop and contribute positively to team-based projects	4.43	A2	21 Being able to identify from a mass of detail the core issue in any situation	4.47	B
6 A willingness to persevere when things are not working out as anticipated	4.42	A1	7 Wanting to produce as good a job as possible	4.47	A1
			38 Being able to organise my work and manage time effectively	4.47	D
			35 Knowing how to manage projects into successful implementation	4.47	D

of dominance. In certain professions, such as primary education and nursing where there is a strong focus on nurturing students and caring for patients, this seems a plausible finding. It is most interesting, however, that in other professions with a strong focus on numbers and materials, such as accounting and engineering, the same type of capabilities dominate. In two professions, law and information technology, the capability domain Intellectual Ability (Scale B) plays a more dominant role. Capabilities such as Item 21 "Being able to identify from a mass of detail the core issue in any situation", Item 24 "An ability to trace out and assess the consequences of alternative courses of action and pick from this the most suitable one", and Item 27 "Being able to set and justify priorities" are perceived as pertinent for effective performance. This may be explained by the need for superior logical thinking and creative reasoning skills in the context of these particular professions. When examining the lowest importance capabilities, there is a specific set of capabilities for the unique context of each profession. There are, however, several items that consistently receive a low ranking – these relate to leadership capabilities such as Item 32 "An ability to chair and participate constructively in meetings" or Item 36 "An ability to help others learn in the workplace". These may be less important because the successful graduates are still in the early stages of their career and may not take a leadership role yet.

Table 3: Items of Least Importance (Bottom 5): All Professions versus IT Profession

Item: All Professions	Importance	Scale	Item: IT Profession	Importance	Scale
33 Being able to make effective presentations to clients	3.90	D	29 Having a high level of current technical expertise relevant to my work area	3.80	C
20 Knowing that there is never a fixed set of steps for solving workplace problems or carrying out a project	3.89	B	11 Having a sense of humour and being able to keep work in perspective	3.80	A1
36 An ability to help others learn in the workplace	3.88	D	15 Understanding how the different groups that make up my organisation operate and how much influence they have in different situations	3.80	A2
5 Having the ability to defer judgement and not to jump in too quickly to resolve a problem	3.84	A1	36 An ability to help others learn in the workplace	3.73	D
32 An ability to chair and participate constructively in meetings	3.79	D	34 Understanding the role of risk management and litigation in current professional work	3.27	D
			10 A willingness to pitch in and undertake menial tasks when needed	2.92	A1

Areas for Improvement

Across all professions there was not one capability item that was rated as low importance for successful practice and rated high on university focus. In other words, universities do not seem to focus on developing capabilities that are seen as unimportant for effective professional practice. This is good news. On the other hand, there are a number of items in each profession which are seen as important for successful practice but which do not receive adequate focus at university. Such potential areas for improvement are identified as capability items which are rated highly on importance for successful professional practice (mean > 4.0) but rated low on the extent to which the university course focused on this item (mean < 3.0). The top five items that meet these criteria are presented in Table 4. Of the top five, only one item is common to the IT profession and all professions: Item 35 " Knowing how to manage projects into successful implementation" from the Generic Skills and Knowledge Scale (D). The nine items identified for improvement include five from the Emotional Intelligence Scale (A), two from the Intellectual Ability Scale (B) and two from the Generic Skills and Knowledge Scale (D). This would indicate that the area of the capability framework that most contributes to differentiating highly successful graduates, Emotional Intelligence Scale (A), is the least well addressed in undergraduate programs.

Areas of Good Practice

Potential areas of good practice are identified as capability items which are rated highly on both the importance for successful professional practice (mean > 4.0) and the extent to which the university course focused on this item (mean < 3.0). The top five items that meet these criteria are presented in Table 5. Of the top five, only one item is common to the IT profession and all professions: Item 21 " Being able to identify from a mass of detail the core issue in any situation" from the Intellectual Ability Scale (B). The nine items identified as good practice include four from the Emotional Intelligence Scale (A), four from the Intellectual Ability Scale (B) and one from the Generic Skills and Knowledge Scale (D). This would tend to confirm the broad perspective of most undergraduate programs.

Table 4: Items of Ranked Highly on Importance and Lowly on University Focus (Top 5): All Professions versus IT Profession

Item: All Professions	Importance	Uni Focus	Scale	Item: IT Profession	Importance	Uni Focus	Scale
4 Being able to remain calm under pressure or when things go wrong	4.63	2.90	A1	1 Being willing to face and learn from my errors and listen openly to feedback	4.73	2.53	A1
16 Being able to work with senior staff without being intimidated	4.46	2.62	A2	35 Knowing how to manage projects into successful implementation	4.47	2.93	D
11 Having a sense of humour and being able to keep work in perspective	4.41	2.88	A1	26 Being able to see how apparently unconnected activities are linked and make up an overall picture	4.33	2.73	B
22 The ability to use previous experience to figure out what is going on when a current situation takes an unexpected turn	4.39	2.95	B	3 Being confident to take calculated risks and take on new projects	4.14	2.64	A1
35 Knowing how to manage projects into successful implementation	4.19	2.99	D	31 Being able to manage my own ongoing professional learning and development	4.13	2.67	D

Table 5: Items of Ranked Highly on both Importance and University Focus (Top 5): All Professions versus IT Profession

Item: All Professions	Importance	Uni Focus	Scale	Item: IT Profession	Importance	Uni Focus	Scale
38 Being able to organise my work and manage time effectively	4.75	3.53	D	8 Being willing to take responsibility for projects, including how they turn out	4.73	3.53	A1
7 Wanting to produce as good a job as possible	4.69	3.85	A1	19 Being able to develop and contribute positively to team-based projects	4.67	4.29	A2
27 Being able to set and justify priorities	4.66	3.65	B	23 Being able to diagnose what is really causing a problem and then test this out in action	4.67	4.00	B
21 Being able to identify from a mass of detail the core issue in any situation	4.53	3.54	B	24 Ability to trace out and assess the consequences of alternative courses of action and from this pick the one most suitable	4.47	3.73	B
13 A willingness to listen to different points of view before coming to a decision	4.41	3.51	A2	21 Being able to identify from a mass of detail the core issue in any situation	4.47	3.53	B

Job Specific Skills and Knowledge

In regard to the place of job specific skills and knowledge (Scale C) measured by Item 29, the ranking for importance is 28 (out of 38) for all professions and 33 (out of 38) for the IT profession (see Table 6). This is relatively low, although it should be noted that the importance ratings are well above 3.50 on the Likert scale (4.06 for all professions and 3.80 for the IT profession). This indicates that having a high level of disciplinary knowledge is assumed but not sufficient for successful professional practice. For high performance in the workplace, disciplinary knowledge needs to be complemented with having capabilities in the other domains such as emotional intelligence, cognitive skills and creative thinking. The stark exception is the law profession. It is difficult to explain why successful graduates in law rate the importance of disciplinary knowledge so relatively highly. It could be that high performance in their profession relies more on disciplinary knowledge than in other professions; however, the same argument could be used for accounting and engineering, professions which require a high level of technical knowledge but receive a lower importance ranking.

Education Quality

Successful graduates were also asked to rate a set of items on educational quality for importance and university focus. Their responses are summarized in Table 7 in terms of mean importance and university ratings. These results are for successful graduates of all professions.

Analysing the top three items of Table 7, successful graduates perceive a close relationship with the workplace as highly important in terms of the assessment of learning, content (workplace problems and scenarios) and background of teaching staff. Further, the development of personal and interpersonal skills is viewed as highly important. This is consistent with the results in relation to the most important capabilities in which emotional intelligence dominated in most professions. When the extent to which universities focuses on these issues is considered, there is a clear discrepancy between the two mean ratings which suggests another potential area of improvement in undergraduate programs.

Table 6: Place of Item 29 on Importance by Profession

Profession	Rank Order/38	Mean Importance
Accounting	25	4.15
Architecture	38	3.65
Education	37	3.90
Engineering	27	4.00
Information Technology	33	3.80
Journalism	32	3.62
Law	6	4.56
Nursing	27	4.38
Sport Management	29	4.08
All Professions	**28**	**4.06**

Table 7: Educational Quality Scale Results

	Item: All Professions	Mean Importance	Mean Uni Focus
48	Make assessment more real-world and problem-based and less focused on memorising factual material	4.38	2.99
40	Use real-life workplace problems identified by successful graduates as a key resource for learning	4.33	2.51
47	Ensure that teaching staff have current workplace experience	4.26	2.99
44	Include learning experiences based on real-life case studies that specifically develop the interpersonal and personal skills needed in my particular profession	4.23	2.74
39	Focus more directly on the capabilities identified as being important by this study in university courses and assessment	4.09	2.79
42	Use successful graduates more consistently as a learning resource in university courses (eg. as guest speakers)	4.08	2.45
41	Make work-placements which test out the capabilities identified in this study a key focus in each course	4.08	2.64
46	Ensure that all teaching staff model the key attributes identified as being important in this study	3.86	2.70
49	Use performance on the capabilities identified as the most important in earlier parts of this study as the focus of assessment and feedback on all learning tasks	3.81	2.64
45	When relevant, use IT to make learning as convenient and interactive as possible	3.67	2.73
43	Decrease the amount of formal classroom teaching of basic technical skills and use self-instructional guides and IT to develop these	2.76	2.42

IMPLICATIONS FOR UNDERGRADUATE PROGRAM DESIGN

Results of this study can be used to review and enhance the validity of assessment and the relevance of the curriculum in undergraduate programs. In particular, capability items labelled as potential areas of improvement as well as items labelled as potential areas of good practice have strong implications for the review and design of undergraduate programs.

Review of curriculum and assessment

A profile of a graduate should be developed based on the importance capability items in the context of each specific profession. Other relevant capability data such as CEQ and Graduate Destination Survey would also be useful to consider when developing a profession-specific profile. Subsequently, graduate capabilities mentioned in the graduate profile should be included and developed in the curriculum and given focus in assessment in undergraduate programs. For example, in IT undergraduate programs the following are all capabilities requiring a focus in assessment and inclusion in the curriculum: project leadership (Item 8); contributing to team-based projects (Item 19) and practical problem solving (Item 23). In particular, the potential areas for improvement should be specifically considered for inclusion and/or more explicit coverage: problem based learning that allows students to learn from mistakes and react to feedback (Item 1); managing projects to successful implementation (Item 35); and relating small, individual pieces to the overall system and organisation environment. These items may be made explicit and listed as key assessment and learning objectives, be part

of formal classroom instruction or they may be addressed in the broader range of formal and informal learning experiences and part of the 'covert' curriculum.

As many of these items relate to Emotional Intelligence a decision needs to be made as to whether these capabilities should be developed by the university … and if so, how this can be done. Should aspects of Emotional Intelligence be covered in one subject or in several subjects and how can they best be sequenced? Some academics may perceive that it is not their task to develop these types of abilities or that these are personal attributes that cannot be learned. Goleman, Boyatzis & McKee (2002), however, state that emotional intelligence can be learned with the provision that some will be better at it than others. Their research indicates that developing these capabilities is essential for successful leadership in the workplace. Further, it is clear from responses on the Educational Quality Scale that successful graduates perceive real-life learning experiences which develop personal and interpersonal skills as one of the most important experiences at university.

There are several other ways in which this study can enhance curriculum and assessment. At certain stages during their time at university, students' perceptions can be measured using the same Professional Capability Scale as that completed by the successful graduates. Results from beginning students can provide a valuable insight as to students' expectations and needs. By completing the same survey as the successful graduates as they enter university, students can set their perceptions of what their chosen profession involves into a realistic context. This is an important component of expectations management. It can also be used to justify why assessment and the learning program which feeds it, is designed as it is. This process is further enhanced if one of the successful graduates addresses first year students, either face to face or on videotape.

Professional Internships

The results of this study can also guide students' professional internships. Awareness of the importance items can assist students in setting relevant learning goals and outcomes for the internship. Working towards developing certain key capabilities will make it a more meaningful experience. In regard to assessing the internship, supervisors can be asked to evaluate the student on performance against these key capabilities.

Although emotional intelligence cannot be taught there is considerable evidence that it can be learnt – once students know the elements of it that are critical to effective early career practice. In this regard, professional internships have been found to provide the most appropriate context in which certain personal, interpersonal and generic skills can be developed (Crebert, Bates, Bell, Patrick & Cragnolini, 2004).

For example, if both students and workplace supervisors are alerted to the top ranking items on Emotional Intelligence from this study, these can be given focus when workplace performance is assessed. Supervisors can look at how students behave in these areas when things go wrong whilst they are on their practicum. Similarly, students can self-assess against the same Emotional Intelligence 'hot spots' and compare their results with their supervisors.

Development of e-Portfolio

The professional capability framework can be used to develop an e-Portfolio for students. An e-Portfolio is a virtual exhibition of a student's work that demonstrates his/her capabilities and has increasingly become an important outcome of education at many universities. Items of the exhibition may include an essay with or without lecturer's comments, a research report, an evaluation by a practicum supervisor, photographs of a university project and/or a video clip of a student presentation. The professional capability framework (the four interlocked domains) can form the framework for the e-Portfolio. The top importance items provide recommendations for aspects of capabilities that need to be developed in order to become a successful graduate in their specific profession.

CONCLUSION

Using quantitative and qualitative data collected through in-depth interviews and an online survey of 194 successful graduates this research project has identified the capabilities that successful graduates identify as being most important for effective early career performance across a wide range of professions. Considering the top capabilities, a profile can be developed for a successful graduate in the unique context of their profession. One of the key findings is that it is the combination of key elements of emotional intelligence, cognitive capabilities, generic and job specific skills and knowledge that is telling, not excellence in one domain. All profession-specific sub-studies consistently identify emotional intelligence as a key component of effective early career professional performance. Yet this component of professional capability is not achieving the attention it deserves in university assessment and learning. There are clear indications that key aspects of emotional intelligence may not be amenable to traditional classroom teaching but they are learnable, once students are alerted to which ones are critical to successful professional performance. All the studies consistently show that possession of a high level of job specific skill and knowledge is necessary but not sufficient for professional success.

With reference to the specific research questions addressed in this paper:

RQ1 How do IT professionals' rankings of capabilities compare in terms of the most highly and least highly rated?

IT professionals rate the top capabilities from three domains: Emotional Intelligence (Scale A), Intellectual Ability (Scale B) and Generic Skills and Knowledge (Scale D). Job Specific Skills and Knowledge (Scale C) are rated lower on importance for effective professional practice while Emotional Intelligence dominates, indicating that well developed personal and interpersonal capabilities are imperative for effective professional performance in IT.

RQ2 How do IT professionals compare with other professionals in their opinions of the relative importance of capabilities in the workplace and in university focus?

IT professionals' ratings are similar to all other professionals with the exception of law. However, for IT professionals, and even more strongly for law, Intellectual Ability (Scale B) plays a more dominant role and is perceived as pertinent for effective performance. As suggested above, this may be explained by the need for superior logical thinking and creative reasoning skills in the context of these particular professions. All professions perceive a close relationship with the workplace as highly important in terms of the assessment of learning, content (workplace problems and scenarios) and background of teaching staff. Further, the development of personal and interpersonal skills is viewed as highly important. This is consistent with the results in relation to the most important capabilities in which emotional intelligence dominated in most professions.

The answers to the questions then provide implications for the design and development of education programs. There is little doubt that the focus for quality in higher education is shifting from an analysis of inputs (e.g. subject content) to gauging the extent to which students are satisfied with the learning designs they experience and the support they receive whilst at university. The next predicted development will be the focus on outcomes – on the extent to which the total university experience has demonstrably added value to the capabilities students need for successful early career performance in their chosen profession or discipline. Thus, it is here that the distinctive 'backward mapping' strategy used in this study provides one practical guide for the future of learning and teaching in higher education.

Although the overall number of respondents to the survey is fairly robust, the number of subjects in each specific profession is rather small. Therefore, findings in each sub-study should be viewed as exploratory. Also, the validity of the scales used, in particular the use of a single item to assess 'profession specific knowledge and skills', needs to be reviewed. Future work will involve scaling up these studies to provide more definite and better validated conclusions when interpreting the findings

REFERENCES

Binney, G. & Williams, C. (1995). *Leaning into the future: changing the way people change organisations*, Brearley, London.

Crebert, G., Bates, M., Bell, B., Patrick, C. & Cragnolini, V. (2004). Developing generic skills at university, during work placement and in employment: Graduates' perceptions. *Higher Education Research and Development 23* (2), 147-165.

Csikszentmihalyi, M. (1996). *Creativity: flow and the psychology of discovery & invention*, Harper Collins, New York

Damasio, A. (1994). *Descartes Error: emotion, reason & the human brain*, Picador, New York.

Department of Education, Science and Training. (2002). *Employability skills for the future*, Australian Government, AGPS, Canberra.

Department of Education, Training and Youth Affairs (1999). *Quality of Australian Higher Education*, AGPS, Canberra.

Dewey, J. (1933). *How we think*, Heath & Co, Lexington, Massachusetts.

Elmore, R.F. (1979). Backward mapping: implementation research and policy decisions, *Political Science Quarterly*, 94, 4, 601-16.

Foley, G (2000*). Understanding Adult Education and Training*, Allen & Unwin, Sydney.

Gardiner, H (1995). *Leading Minds*, Basic Books, New York.

Goleman, D. (1998). *Working with Emotional Intelligence*, Bloomsbury, London.

Goleman, D. (2000). Leadership that gets results, *Harvard Business Review*, March-April, 2000: 78 – 90.

Goleman, D., Boyatzis, R., and McKee, A. (2002). *Primal leadership: realizing the power of emotional intelligence*, Harvard Business School Press, Boston, MA.

Gonczi, A., Hager, P. & Oliver, L. (1990). *Establishing Competency Based Standards for the Professions*, NOOSR, DETYA.

Huberman, M & Miles, M (2001): 'Data management and analysis methods', in Conrad, C et al (Eds) : *Qualitative Research in Higher Education*, Pearson, Boston, pp. 553 – 571.

Morgan, G (1988). *Riding the Waves of Change: Managerial competencies for a turbulent world*, Jossey Bass, San Francisco.

Schön, D. (1983). *The Reflective Practitioner*, Basic Books, New York.

Scott, G. (1996). 'Change, competence & education' in Ryan, G (Ed): *Learner Assessment & Program Evaluation*, APLN, Sydney, pp. 75-107.

Scott, G. (2003), Using successful graduates to improve the quality of curriculum and assessment in nurse education, *Australasian Nurse Educators Conference*, Rotarua, New Zealand, September.

Scott, G. & Yates, W. (2002). Using successful graduates to improve the quality of undergraduate engineering programs, *European Journal of Engineering Education*, 27, 4, 363-78.

Scott, G. & Wilson, D. N. (2002). Tracking and Profiling Successful IT Graduates: An Exploratory Study in Wenn, A., McGrath, M. & Burstein, F. (eds): *Enabling Organisations and Society through Information Systems - Proceedings of the 13th Australasian Conference on Information Systems*, Victoria University of Technology, Melbourne, December, pp. 1185-1195.

Tennant, M. (1991). Expertise as a dimension of adult development, *New Education*, 13, 2, 49-56.

Tough, A. (1979). *The Adults' Learning Project*, OISE Press, Toronto.

UK Centre for Research into Quality. (2004). Retrieved 8 June, 2004 from http://www.uce.ac.uk/crq.

APPENDIX A: CAPABILITY SCALES

Emotional Intelligence - Personal (A1)

1. Being willing to face and learn from my errors and listen openly to feedback
2. Understanding my personal strengths & limitations
3. Being confident to take calculated risks and take on new projects
4. Being able to remain calm under pressure or when things go wrong
5. Having the ability to defer judgement and not to jump in too quickly to resolve a problem
6. A willingness to persevere when things are not working out as anticipated
7. Wanting to produce as good a job as possible
8. Being willing to take responsibility for projects, including how they turn out
9. Having an ability to make a hard decision
10. A willingness to pitch in and undertake menial tasks when needed
11. Having a sense of humour and being able to keep work in perspective

Emotional Intelligence - interpersonal (A2)

12. The ability to empathise with and work productively with people from a wide range of backgrounds
13. A willingness to listen to different points of view before coming to a decision

14. Being able to develop and use networks of colleagues to help me solve key workplace problems
15. Understanding how the different groups that make up my organisation operate and how much influence they have in different situations
16. Being able to work with senior staff without being intimidated
17. Being able to give constructive feedback to work colleagues and others without engaging in personal blame
18. Being able to motivate others to achieve great things
19. Being able to develop and contribute positively to team-based projects

Intellectual Capability (B)

20. Knowing that there is never a fixed set of steps for solving workplace problems or carrrying out a project
21. Being able to identify from a mass of detail the core issue in any situation
22. The ability to use previous experience to figure out what is going on when a current situation takes an unexpected turn
23. Being able to diagnose what is really causing a problem and then to test this out in action
24. An ability to trace out and assess the consequences of alternative courses of action and, from this, pick the one most suitable
25. Being able to readjust a plan of action in the light of what happens as it is implemented
26. Being able to see how apparently unconnected activities are linked and make up an overall picture
27. Being able to set and justify priorities
28. An ability to recognise patterns in a complex situation

Profession-specific Skills & Knowledge ©

29. Having a high level of current technical expertise relevant to my work area

Generic Skills & Knowledge (D)

30. Being able to use I.T. effectively to communicate & perform key work functions
31. Being able to manage my own ongoing professional learning and development
32. An ability to chair and participate constructively in meetings
33. Being able to make effective presentations to clients
34. Understanding the role of risk management and litigation in current professional work
35. Knowing how to manage projects into successful implementation

36. An ability to help others learn in the workplace
37. Understanding how organisations like my current one operate
38. Being able to organise my work and manage time effectively

APPENDIX B: EDUCATIONAL QUALITY SCALES

39. Focus more directly on the capabilities identified as being important by this study in university courses and assessment
40. Use real-life workplace problems identified by successful graduates as a key resource for learning
41. Make work-placements which test out the capabilities identified in this study a key focus in each course
42. Use successful graduates more consistently as a learning resource in university courses (e.g. as guest speakers)
43. Decrease the amount of formal classroom teaching of basic technical skills and use self-instructional guides and I.T. to develop these
44. Include learning experiences based on real-life case studies that specifically develop the interpersonal and personal skills needed in my particular profession
45. When relevant, use I.T. to make learning as convenient and interactive as possible
46. Ensure that all teaching staff model the key attributes identified as being important in this study
47. Ensure that teaching staff have current workplace experience
48. Make assessment more real-world and problem-based and less focused on memorising factual material
49. Use performance on the capabilities identified as being most important in earlier parts of this survey as the focus for assessment and feedback on all learning tasks

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